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## NEW FROGS FROM MINNESOTA.

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In studying any species of animal it is a great advantage to be able to see a large number of specimens. In the present case, F. J. Burns & Co., produce dealers of Chicago, very kindly gave me free access to the frogs they have brought here for sale. In some cases locality records are poor but, in general, we are able to be fairly sure of the name of the place from which the shipment was made and it seems likely that the frogs were actually caught within a few miles of the shipping point.

One of the forms here described has been recognized for some years and considered simply as an aberrant form of *Rana pipiens*. The other is apparently undescribed, although it seems to be very well marked and present in fairly large numbers in a rather restricted region.

There may be some question as to the propriety of describing species based on color characters alone, especially in a group where the color variation of any particular individual may be so great as in the frogs. However the author feels that the differences shown are so constant and of such a degree as to warrant their receiving a name and that their exact status, whether specific, subspecific or varietal must be determined by future examination, for which he has neither the time nor the equipment. It seems probable that the final decision as to the validity of these species must rest on the result of carefully controlled breeding experiments.

Both of these forms are sufficiently different from *Rana pipiens* to be readily seen in a tank containing several thousand frogs of that species.

***Rana burnsi*, sp. nov.***Measurements of the type specimen:*

Snout to vent	74 mm.
Length of head	22 mm.
“ to rear of eye	19.5 mm.
“ of eye	9 mm.
“ of ear drum	6 mm.
“ from vent to heel	69 mm.
“ from vent to knee	31 mm.
“ from knee to heel	38 mm.
“ of hind foot	58 mm.
Width of head at rear of ear drum	24 mm.

The web of the hind foot is quite variable. In the type it appears as a keel on the sides of about two and one half joints of the longest toe, but is clearly visible practically to the end of that toe. In some other specimens it is much larger and stretches almost directly across between the tips of the toes. There is every degree of variation between the two conditions.

The color is extremely variable in each individual according to conditions of fear, etc., as well as in response to the color of the environment but is very uniform in the species as a whole.

The color of this species is usually some shade of green or brown, varying from the color of an old water-soaked board to a very light mist gray and to a light apple green. About a third of the specimens have irregular black spots on arms or legs or both. These spots never approach the condition of regular cross barring so often seen in *Rana pipiens*. They look more like blots of ink that might have gotten there accidentally.

The brown color changes of *Rana burnsi* match almost exactly the similar changes of the Wood Frog, *Rana sylvatica*, the main difference being that the latter species seldom shows a strong green color and always has a black patch at the side of the head, which is lacking in *Rana burnsi*.

*Rana burnsi* has been known for some years and is generally considered simply an immaculate form of *Rana pipiens*. Breeding experiments may show that this view is correct. The author believes, however, that there are sufficient grounds for giving it a separate specific name, in the present state of our knowledge of the group.

The species seems to be confined to northern Iowa and southern Minnesota, with possibly some stragglers in western Illinois and Wisconsin. It seems to differ from *Rana pipiens* only in color but no intergrading forms have yet been found in the examination of many thousand specimens. In size it is a very little smaller than *Rana pipiens*. That is, the very largest individuals of the latter species are a little larger than the very largest ones of the former. In length of leg and in the webbing of the hind foot *Rana pipiens* is extremely variable and *Rana burnsi* is within the range of variation. Some specimens of *Rana pipiens* have very short legs while others have very long ones. In different individuals the heel reaches from eye to end of snout. Some specimens have two whole joints of the longest toe free from the web while others have almost as large a web as a Bullfrog.

The measurements given are of the type, which is number 3065 of the reptile collection of Field Museum of Natural History. This specimen, and twenty paratypes, was received from New London, Kandiyohi County, Minnesota. There are about eighty other specimens of this species in the collections of Field Museum, from Spicer, Kandiyohi County, Minnesota; Okabena, Jackson County, Minnesota; Rothsay, Wilkin County, Minnesota and Astoria, Deuel County, South Dakota.

*Rana burnsi* is named in honor of Messrs. F. J. Burns and J. J. Burns, whose courtesy and cooperation made it possible to get the specimens on which this paper is based.

***Rana kandiyohi*, sp. nov.**

*Measurements of the type specimen:*

Snout to vent	69.0 mm.
Length of head	21.5 mm.
“ to rear of eye	17.5 mm.
“ of eye	9.0 mm.
“ of ear drum	5.0 mm.
“ from vent to heel	67.0 mm.
“ from vent to knee	31.0 mm.
“ from knee to heel	36.0 mm.
“ of hind foot	56.0 mm.

Width of head at rear of ear drum 24.0 mm.

The web of the hind foot is variable. In the type it is continued as a rather broad keel to the end of the longest toe. In one paratype it reaches about the middle of the distal joint of the longest toe. In the other paratype it extends on the next to last joint of longest toe as a very narrow keel.

Typical specimens of this species show a color pattern which suggests a blending of *Rana pipiens* and *Rana septentrionalis*. It is as though the black spots of *Rana pipiens* had been superposed on the mottled color of *septentrionalis*. The spots are not as evenly rounded as in *pipiens* but show a tendency to fuse with the mottlings between them. The vermiculate mottlings are carried down on the legs and feet and are there combined with a dark harring like that of especially dark colored examples of *Rana pipiens*.

The mottled color of the back is carried well down on the sides of this species and fades gradually into the white of the under parts. The light stripes along the glandular ridges are similar to those in *Rana pipiens* and sometimes in *Rana burnsi*.

The ground color is represented by small spots and lines between the darker parts of the mottlings. It is about the same as in *Rana pipiens*. Sometimes the mottlings are as dark as the spots. At other times they are lighter.

The type, Number 3066, Field Museum of Natural History, was received from New London, Kandiyohi County, Minnesota. Two other specimens, paratypes, came from an unknown locality in Minnesota. About thirty other specimens were found in lots of frogs from Rothsay, Wilkin County, Minnesota, and from Astoria, Deuel County, South Dakota.

There is no indication of any intergradation in color pattern except in specimens coming from the immediate vicinity of Lake Traverse and of Big Stone Lake on the boundary between Minnesota and the Dakotas.

Almost all the Leopard Frogs from a region perhaps one hundred miles north and south along the boundary between Minnesota on the east and North and South Dakota on the west show more or less plainly a tendency to intergrade with the species under discussion. In fact, there seem to be more specimens with typical coloration of *Rana kandiyohi* than with that of *Rana pipiens*.

The taxonomic value of this variation can not be well understood until the frogs of the region west of Big Stone Lake can be critically studied. From the data already at hand we may suppose *Rana kandiyohi* to be a form developed along the upper course of the Minnesota River, either as a variant of *Rana pipiens* or as a result of hybridization with some other form.

If this species is only a variant of *Rana pipiens*, produced by some ecologic factor, we may expect to find it more common a little farther west, or perhaps even supplanting the latter species at the western limit of the range of frogs in the arid belt.

The name *Rana kandiyohi* is proposed with some misgivings because of the small knowledge we have of the form and its relation to other frogs and to its environment. Localities from which we have received it are, with one exception, in the southwest quarter of Minnesota. The other record is barely across the state line in South Dakota. It is to be hoped that careful field studies may be made of the frogs of the region within a hundred miles of Big Stone Lake in order that ecologic studies may supplement our present knowledge of the group.

In conclusion, it may be well to mention that males of *Rana kandiyohi* kept alive in the aquarium have been croaking vigorously for some weeks and that their note is quite distinct from that of some *Rana pipiens* from the vicinity of Chicago. The note of the Leopard Frog is more or less a succession of syllables and may be almost represented by striking stones together rather rapidly. That of *Rana kandiyohi* is more in the nature of a croak and might be represented by grinding two stones together under considerable pressure.